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EMOTIONAL REACTIONS AND PSYCHOLOGICAL EXPERIMENTATION*

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In 1890 William James paid his respect to the then current literature on the psychology of the emotions in the following words: "But as far as scientific psychology of the emotions goes, I may have been surfeited with too much classic reading on the subject, but I should as lief read verbal descriptions of the shapes of the rocks on a New Hampshire farm as toil through them again.¹ James in his turn then gave a clever formulation of what he considered to be the fundamental principles involved in all emotion: "My theory, on the contrary, is that the bodily changes follow directly the perception of the exciting fact and that our feeling of the same changes as they occur IS the emotion."

For twenty-six years psychologists have been content with James' barren but graceful formulation. Apparently "having the goose that lays the golden egg" has so contented our experimental natures that we have not taken the time nor the trouble to encourage the goose to continue her activity. It has taken psychology many years to break away from James' fascinating way of formulating psychological principles. No better proof of this can be found than in Angell's recent contention that James' theory is still broad enough to embrace all of the recent results which have come to us from the

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¹ If anyone believes that our general treatises on emotions are any more exciting today, let him try to read McDougall's *Social Psychology* and Shand's work on the sentiments.

physiologist's study of the endocrine glands.² However satisfactory this may be for those who are not yet ready to accept a behavioristic formulation, it can hardly be denied that James' conception of the emotions leaves us with no handle for experimentation.³ The psychologist is being constantly asked by his own students as well as by the physicians, educators, and jurists: "Why do you not work upon the emotions? They are of more importance in the guidance and control of the human organism than any of your hair-splitting work upon thresholds." Sometimes the psychologist defends himself by telling his questioners that his laboratory will undertake to work out any problems they will set him. But this is only a subterfuge. The psychologist has not attempted to formulate and spread the problems in emotions. And why should the man who needs to *use* psychological methods in a practical way be forced to do the psychologist's task for him?

Thorndike has with some measure of success broken away from the traditional formulation. In "The Original Nature of Man" he has adopted the uniform procedure in discussing both instinctive and emotional reactions of giving as best he can the original stimulating factors and the original responses. One feels though that he has done this by a kind of *tour de force*. Having waded through the enormous literature he tries to produce simplification not by adopting any central or unifying principle but by picking out several hundred of the reactions which are most universally admitted as

² Angell's words are as follows: "And I think he would perhaps urge that, after all controverted points are left aside, the main issues for which he would wish to contend are (1) the instinctive basis of emotional reactions, and (2) the invariable re-percussion upon the cortex of these reflex effects in the muscles, glands, and viscera. Phrase your doctrine so that these two great groups of facts are recognized and properly evaluated, and you may call your theory Jamesian or not as you please. You will at least have accepted what lies at the root of James' theory." In regard to (1) we shall try to show that while it is true it is only one of the important facts, the other one being that emotions can be torn away from the original stimuli which called them out and attached to other stimuli at will. In regard to (2) we should say that the cortical re-percussion is not essential (even if true) except to an introspective psychology. The important thing is that secretions occur which so change the physiological state of the person that he can do things which he cannot do at other times (increased endurance, strength, elimination of fatigue products, etc.). Of these important changes the person can give no account (probably *no cortical* 're-percussion' and hence no arousal of language habits).

³ Or we should probably better phrase it, with the wrong handle. No more pitiful sight can be seen anywhere than that afforded in our libraries where the collection of plethysmographic studies upon the emotions are shown.

being present and stating their important features in an objective way. We have no fault to find with this procedure if all of the reactions which Thorndike lists belong to the original nature of man. We doubt seriously that this is the case. We have reason to think that very many of the reactions which Thorndike puts down as original in the nature of the infant are undoubtedly the product of the environment.

If Thorndike has been overly prodigal in his enumeration of the emotional reactions which belong to man's original nature, the Freudians have been too parsimonious. While they admit the presence of other emotional reactions than those belonging to the sexual sphere (using this term as Freud would himself) the latter they insist are nevertheless the ones which play the most important rôles. We may very readily admit this in most "psychogenic" cases but the doctrine is not satisfying from an experimental point of view. Such a view is entirely too narrow and it does not do justice to the other emotional reactions. Furthermore, the Freudian point of view does not help the laboratory psychologist in gaining experimental control over the whole system of emotional reactions.

We should strive to reach some formulation of the emotional reactive tendencies which will give ample scope for psychological experimentation and which will at the same time do justice to the wealth of material which modern psychiatric methods have yielded.

After observing a large number of infants, especially during the first months of life, we suggest the following group of emotional reactions as belonging to the original and fundamental nature of man: *fear*, *rage*, and *love*, (using love in approximately the same sense that Freud uses sex).⁴ We use these terms which are current in psychology with a good deal of hesitation. The reader is asked to find nothing in them which is not fully statable in terms of situation and response. Indeed we should be willing to call them original reaction states, X, Y, and Z. They are far more easily observ-

⁴ This list is identical with James' list of *coarser* emotions except for the omission of grief which James puts first. Grief we look upon as being a *reactive state* (connected with love, really) in which the object or situation which usually calls out in the subject the reactions of love is suddenly removed. The state of grief must be looked upon as a mal-adjustment period where the objects and situations which have usually called out both the original love responses and the conditioned reflexes built upon them are lacking. The state (in normal cases) disappears as soon as new objects are found or new conditioned reflexes have been entrained.

able in animals than in infants. While we do not claim that this list is complete, we do claim that our own observation of the first few months of infancy has not yielded any larger number.

Fear. What stimulus apart from all training will call out fear responses; what are these responses; and how early may they be called out? The principal situations which call out fear responses are as follows: (1) To suddenly remove from the infant all means of support, as when one drops it from the hands to be caught by an assistant. (In the experiment the child is held over a bed upon which has been placed a soft feather pillow.) (2) By loud sounds. (3) Occasionally when an infant is just falling to sleep the sudden pulling of the blanket upon which it is lying will produce the fear responses. (4) Finally, again when the child has just fallen to sleep or is just ready to awaken, a sudden push or a slight shake is an adequate stimulus. (2) and (4) above may be looked upon as belonging under (1). The responses are a sudden catching of the breath, clutching randomly with the hands (the grasping reflex invariably appearing when the child is dropped), blinking of the eye lids, puckering of the lips, then crying; in older children possibly flight and hiding (not yet observed by us as 'original' reactions). In regard to the age at which fear responses first appear we can state with some sureness that with few exceptions the above mentioned group of reactions appear at birth. These findings agree so far with the position taken by Thorndike in *The Original Nature of Man*. It is often stated that children are instinctively afraid in the dark (Thorndike). While we shall advance our opinion with the greatest caution, we have not so far been able to gather any evidence to this effect. When such reactions to darkness appear they are due to other causes; darkness comes to be associated with absence of customary stimulation, with noises, etc. (They should be looked upon as conditioned fear reactions.) From time immemorial children have been "scared" in the dark, either unintentionally or as a means of controlling them (this is especially true of children reared in the South).

Rage. In a similar way the question arises as to what is the original situation which brings out the activities seen in rage. Observations seem to show that the *hampering of the infant's movements* is the factor which apart from all training brings out the movements characterized as rage. If the face or head is held crying results, quickly followed by screaming. The body stiffens and fairly well coördinated slashing or strik-

ing movements of the hands and arms result; the feet and legs are drawn up and down; the breath is held until the child's face is flushed. In older children the slashing movements of the arms and legs are better coördinated and appear as kicking, slapping, biting, pushing, etc. These reactions continue until the irritating situation is removed, and sometimes do not cease then. Almost any child from birth can be thrown into a rage if its arms are held tightly to its sides: oftentimes even if the elbow joint is clamped tightly between the fingers the responses appear: at times just the placing of the head between cotton pads will produce them. Even the best natured child will show rage if its nose is held for a few seconds.

Love. The original situation which calls out the observable love responses seems to be the stroking or manipulation of some erogenous zone, tickling, shaking, gentle rocking, patting, turning upon the stomach across the attendant's knee, etc. The response varies—if the infant is crying, crying ceases, a smile may begin, attempts at gurgling, cooing, and finally, in slightly older children, the extension of the arms which we should class as the forerunner of claspings in the narrowed sex act in coitus. The smile and the laugh which Freud connects with the release of repression (we are not denying in the case of adults that this may not be true) we should thus class as original reaction tendencies intimately connected from infancy with the stimulation of the erogenous zones. By original nature the child is not *polymorpheus perversus*, nor addicted to playing with urine, fecal matter or (originally) even with the anus or sex organs. Habits (conditioned reflexes) are rapidly set up in connection with these objects at a *very* early age and they may when not looked after sadly warp the child. Jung is quite right in giving up Freud's conception of the original nature of the child, but at such an early age may habits of perversity arise that one not observing children from birth might very well suppose that the acts in question belonged to its original nature.⁵ From birth the child will put a finger or a part of the hand in its mouth (native reflex connected with feeding). There is no such

⁵ We should say, though, that after all Freud's conception is nearer the practical truth than Jung's present one. Where Jung can hope to get scientifically with his present excursion into the realms of folk lore we cannot possibly see—we are undoubtedly receiving at his hands interesting and really fascinating literary productions on the subject of folk lore.

original tendency to bring the hand to the sex organs. The earliest well marked responses of this kind we have seen were observed in a baby girl approximately one year old. She was in her bath playing with a small box. In her efforts to get it her hand slipped and came in contact with the vagina and entered it. A characteristic smile overspread her face and her efforts to recapture the box ceased. But at this age the child had formed varied habits of manipulation. Our contention here is that her own manipulation of the erogenous zone was brought about by the formation of a habit. That such a conditioned reflex or habit might arise at an earlier age is beyond question.⁶

It may be argued that if these three emotional reactions are the important ones and that if the stimuli which call them out are as simple and crude as we now suppose them to be, then our theory of the emotions is superficial and patently unable to care for the enormous complexity in the shading of emotional reactions in adults.

This argument brings out the chief fault we have to find with the current conception of emotion. Depending blindly upon the fact that emotional reactions are hereditary, we have put the emphasis on trying to *enumerate* the hundreds of objects and situations which produce the hundred or so of emotional reactions, instead of taking emotions as we find them and trying to put them under experimental control.

So far no one has tried explicitly to introduce the illuminating concept of habit formation into the realm of emotions. This is not quite true since the concept of *Uebertragung*,⁷ however mystical and unintelligible the Freudians have made it, is nothing more nor less than habit formation (although they have not so presented it), as both Wells and Watson have pointed out. It is extremely interesting that the Freudians were the first to utilize this principle and it is more or less of a reflection upon us that we did not have it worked out ready for the use of the psychopathologist. But the analyst uses the concept only in a practical way. His experiment is made for him. The patient comes to him with the transfers already made. The psychiatrist's problem in a particular case

⁶ The term conditioned reflex does not make the word habit superfluous. Habit is a series of conditioned reflexes. The conditioned reflexes are the units into which all habits may be resolved.

⁷ Freud uses *Uebertragung* in a very narrow sense—the attachment of the patient's love-reactions to the physician making the analysis. We use the term here in the broader sense in which it is used by Ernest Jones (*Papers on Psychoanalysis*).

is the breaking up of the abnormal forms of attachment⁸ to such an extent that the patient is placed in a position to form new and non-conflicting attachments. His interest is largely in the patient and need not be particularly scientific. The psychologist, on the other hand, cannot afford to rest until he can control his phenomena—until he can not only *produce attachments* and study the laws of their production, but also *reduce* and break them up at will and learn the principles controlling their reduction. He must find a uniform procedure which will allow at least approximate reproducibility of his results. In general, he must have his phenomena under such control that he can watch their inception, course, and end.

We have spoken thus far of transference within the sphere of love (and by *Uebertragung* the Freudian means only transference in the sphere of sexual emotion): *But there is no reason to suppose that the same thing does not occur in the other emotions.* Rage⁹ likewise is capable of being attached now to one object, now to another in an ever widening series—i. e., given an original situation which will arouse rage (see p. 167) and you will have transfers wherever the conditions are at hand for the arousal of conditioned reflexes. An individual hampers my use of my arms and legs, constrains me, holds me badly when dressing me, etc. (original conditions for arousing rage)—shortly the mere sight of that individual arouses the rage components. Finally an entire stranger whose behavior is even slightly similar to that of the first individual may set off the responses.¹⁰ [The rage that appears towards inanimate objects, stones, sticks, close confinement, etc., which hamper our movements, is probably not conditioned but is the remains of the fundamental situation and response.]

Similarly, fear being at first a simple group of responses called out by a rather definite situation (see p. 166) soon becomes attached to an ever increasing series of objects. Probably the best illustration of this is to be seen in the responses of most individuals to lightning. The hands are put

⁸ In view of the generally narrow use made of the concept *Uebertragung* in most Freudian literature it seems advisable to get some better form of expression. The English translation "transfer" has also a very restricted use. In view of this we suggest the terms "attachment" and "detachment" of the emotions, etc.

⁹ And we should unhesitatingly affirm that rage and fear and *not love* play the preponderating rôle in early infancy.

¹⁰ As adults we would say on seeing such a stranger: "I can't stand that person. I have an instinctive aversion to one who looks like that."

over the eyes, breathing is momentarily checked, and temporary paralysis of all movement of the limbs appears, giving place to movements which bring the subject under cover. We have never seen a child show fear reactions even to momentary flashes of light in a dark room. At most in this latter case there is a blinking of the eye lids and a slight movement of the head. Loud *noises*, however, will produce the group of reactions in question. In daily life the sudden lightning flash is usually followed by a heavy peal of thunder. The two occurring almost simultaneously afford the most suitable conditions for arousing a conditioned reflex. If the thunder is delayed five seconds or more the subject may have gone through the whole gamut of movements before the sound appears and will no longer react to it when it comes.

Recent physiological work tends to strengthen our hypothesis that fear, rage, and love are the most fundamental modes of emotional response. Crile has been attempting for some time to connect the reactions in love with glandular secretions of the thyroid but so far he has not produced very satisfactory experimental evidence, nor a very clear theoretical view. It is from Cannon's work that we get our best experimental evidence that under the influence of secretions called out from the ductless glands by the major emotions the *organism's physiological state is so changed that it can do things (and endure things) which it could not do when such secretions are absent*. This is our real evidence for the assumption that the emotions furnish the "drive" for many forms of activity. Cannon has shown that the situations or objects which call out fear and rage at the same time call out reflexly adrenal secretion and that this secretion can, by virtue of its power of exciting the sympathetic system, cause the reactions seen in those states to continue long after the exciting object has been removed. Furthermore this secretion can attack the store of glycogen in the liver and set it free as a source of food supply for the muscles. At the same time circulation is bettered and fatigue products are washed from the muscular tissue. The organism is thus put in a changed state which *may* be advantageous both for attack and defense and for the formation and functioning of habits as well. An interesting confirmation of this was recently demonstrated in our laboratory while testing the grasping reflex of infants. In many cases we find that the child either cannot at first support its full weight with either right or left hand, or if so only for an instant. If, however, we first produce a state of rage in the infant by hampering its movements we rarely

fail to get it to support its full weight for a considerable time. We here utilize in an experimental way the emotional 'drive' to bring about an increase in the strength and endurance of a non-emotional act (viz., in the grasping reflex). This leads us to our central topic. We have tried to show as best we can in the lack of more exact experimental evidence (1) that by the method of conditioned reflexes, emotional reactions can be called out by situations (stimuli) which do not at first call them out; and (2) that emotions, by virtue of the secretions which are present, furnish a 'drive' (possibility of reaction or continuance of the reaction) which is lacking in ordinary instinctive and habitual actions. These two assumptions, if they are true, should bring the subject of emotions directly into the focus of experimentation.¹¹ Experimentation should not be more difficult here than in any other field. The writers have already begun the following experiment: by means of a heliostat to suddenly flash a beam of light upon an infant's face, the infant lying face upward upon a table in a dark room; simultaneously with the flash a sound stimulus resembling thunder is made. Our object is to see whether the flash of light will in time come to produce the *cry* which the noise calls out.

In the same way we shall attempt to see if the bodily struggles which appear in rage may not be conditioned by a slight contact, sound, odor, or light stimulus. In animals our experimentation could be made much more thorough for there

¹¹ Here we should like to offer a criticism not of the Freudian psychology but of their methods of observation. They have not examined with sufficient care the concrete daily situations of infant and child life. Instead of going to the realm of folk lore for our store of illustrations, we should go to the nursery and watch the child at its bath, as it is being dressed, its early habits of bodily manipulation, its use of toys, etc. Thus instead of going to folk lore to understand much of what we see in later symbolic adjustments, we should go to the nursery not only to find the concrete explanation of symbolism but also to seek for much of the data for the understanding of folk lore.

In time we hope the men behind the psychoanalytic movement will come to realize that they have not, as White maintains, built up a complete psychology differing *toto caelo* from anything which had existed before. When clearer discussion is possible we venture to predict that the one thing which will stand out as distinctly Freudian will be their utilization of the principle of *Uebertragung*. To our mind this is the essential concept in Freudian psychology. The whole group of concepts—the 'unconscious,' 'repression,' 'sublimation,' etc., will soon pass into the limbo of yesterday. Had Holt discovered the key to Freudian psychology (or as he states it, "the key to psychology") to be *Uebertragung* instead of the "wish" he would have come nearer to having pointed out their greatest contribution.

we may work directly in the sphere of the sex emotions. After such transfers or *attachments* have been brought about the process of *detachment* can be studied in a similar way. It would not be hard to plan now a comprehensive series of experiments which would have for its object the understanding of the mechanisms of attachments and detachments of the emotional reactions.

Love is a field in which early experimentation is much more difficult. On account of the peculiar situations which bring out love responses in infants (stimulation of the erogenous zones) we probably cannot safely use this emotion in its original connections. But the infant very shortly makes attachments for itself. Very soon the sight of the mother, on account of the fact that she bathes, feeds, and pets the child, begins to call out the responses of love. She becomes a stimulus substitutable for the original stimulus. Later on other persons, dolls, toys, etc., begin to condition those reactions.

If emotion can be attached in this way, and if such attachments can be made to serve a useful end such as that of helping individuals to form necessary but prosaic habits, interesting practical outcomes may be expected from our work. That our remarks may not seem wholly theoretical we wish to offer the following for consideration: students' "attachments" to teachers are very common ("crushes"). We have asked many schoolmen whether a pupil upon entering a grade and shortly forming such an attachment to the new teacher does not do better for that teacher than for the teacher in the grade below who did not call out the attachment. We have never received a satisfactory answer. Not long ago the senior writer asked this question of a somewhat distinguished body of teachers from all parts of the country. Most of them seemed to suggest by their manner that they had been asked a peculiarly personal question. The subject, however, is an objective one and needs consideration. As we look back upon our own school life we are convinced that those teachers, both men and women, for whom we had strong attachments have been the ones from whom we have received lasting benefits. Nor is the case very different with the other two emotions. A teacher who has on occasion a sharp and caustic tongue can by the use of it induce a modified rage response in his pupils which may be extremely useful in raising the level of achievement of the class. Likewise the teacher who can and at times does induce the fear reactions becomes a powerful factor in the lives of his pupils.

So convinced are we of the possibilities of getting higher incentives or drives from the use of these emotional factors that we are sure our selection of teachers would be greatly influenced by our views. We think it would be a safe move now to provide in the early grades men teachers for the girls and women teachers for the boys, these teachers to be chosen for their pleasing personalities and for their ability to attach the pupils to themselves in strong but wise friendships. This arrangement would yield the additional service of breaking the now too great fixation on the parents. We fear that one reason for the widespread homosexuality among women is due to the fact that young girls spend the greater part of their lives under women teachers. In the high school our selection again would be influenced by the extent to which the proposed teacher would call out, control, and use wisely the emotional life of the child. Hitherto our selection of teachers, when there has been any selection at all, has been made upon the basis of their erudition. Most of them are erudite enough but few of them have the gift of controlling and using the pupils' emotional life.

But the interests of the laboratory men are not more centered upon the educational field than upon the practical and vocational sides of life. In the business world the mass of workers accept a level of adjustment which is far too low. James in his *Energies of Men* has brought this out far better than we can hope to do. Many of our laboratory studies bring out the same factors. Unless the stimulating values are kept constant and high, stages of non-improvement or plateaux appear in the learning curves. The cry of the business man today is: "How can I control this?" The solution would appear to lie in getting the act, in which improvement has ceased, hitched up in some way with an emotional state, for in this way an added "drive" may appear and a new level of adjustment be reached.¹² Whether connection should be made through rage, fear, or love is an experimental problem.

¹² It is interesting to note here too how early this conception of the "added drive" throws light upon the fact that under the influence of high emotional stimulation outcasts from society have been known to come back and to reestablish a stable system of habits. Oftentimes the emotional period does not last long enough for stable habits to be formed and the 'convert' backslides. Marriages to save the man when they have resulted in reformation may owe their happy culmination to this factor. Possibly a more judicious and less prodigal use of sex in the early stages of marriage (thus maintaining the high emotional state for a longer period of time) would bring about a much larger number of reformations.

Many drives have been hit upon in a practical way already, by business houses such as threatening discharge (fear), by ridicule (rage), and by getting the individual attached to the "house" through "loyalty" (love). The bonus and participating schemes have proven equally satisfactory for enhancing emotional reactions and hence in getting higher levels of adjustment.

We have developed these highly speculative considerations which have to do with educational and vocational problems to show the ready demand which there is for the scientific findings of laboratory studies of the emotions. The main contentions we have raised here concerning the possibility of detaching emotions from situations in which they are not serviceable and attaching them to situations in which they may be of service may be found to be far from correct; but if experiments are set in motion which will bring out the true relations we shall gladly retract any heresy of which we may have been guilty. We think no one can deny that the laboratory has a possible method of bringing the emotions under experimental control.

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